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(54) Paging receiver

(57) A paging receiver has identification means for confirming the existence of a message still unread by a user of the paging-receiver and stored in a memory, and the user sets a time schedule for confirming the presence of the unread message and notification schedules for notifying the reception of the message and the presence of the unread message using a plurality of notification means, and when the reception of the message or the presence of the unread message is confirmed, the paging receiver notifies the reception of the message or the presence of the unread message in accordance with the appropriate notification schedule, and displays the received or the unread message.

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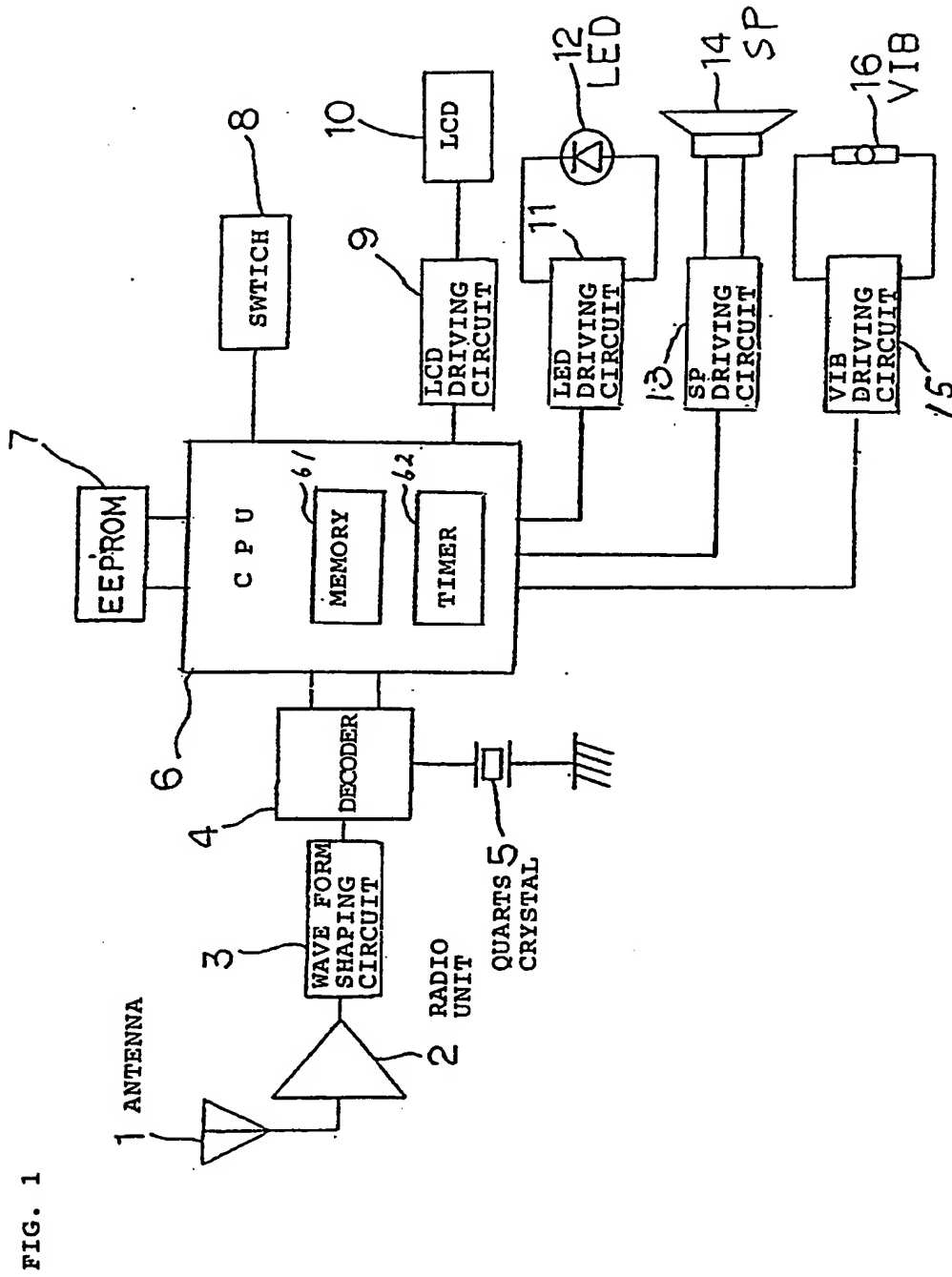


FIG. 2

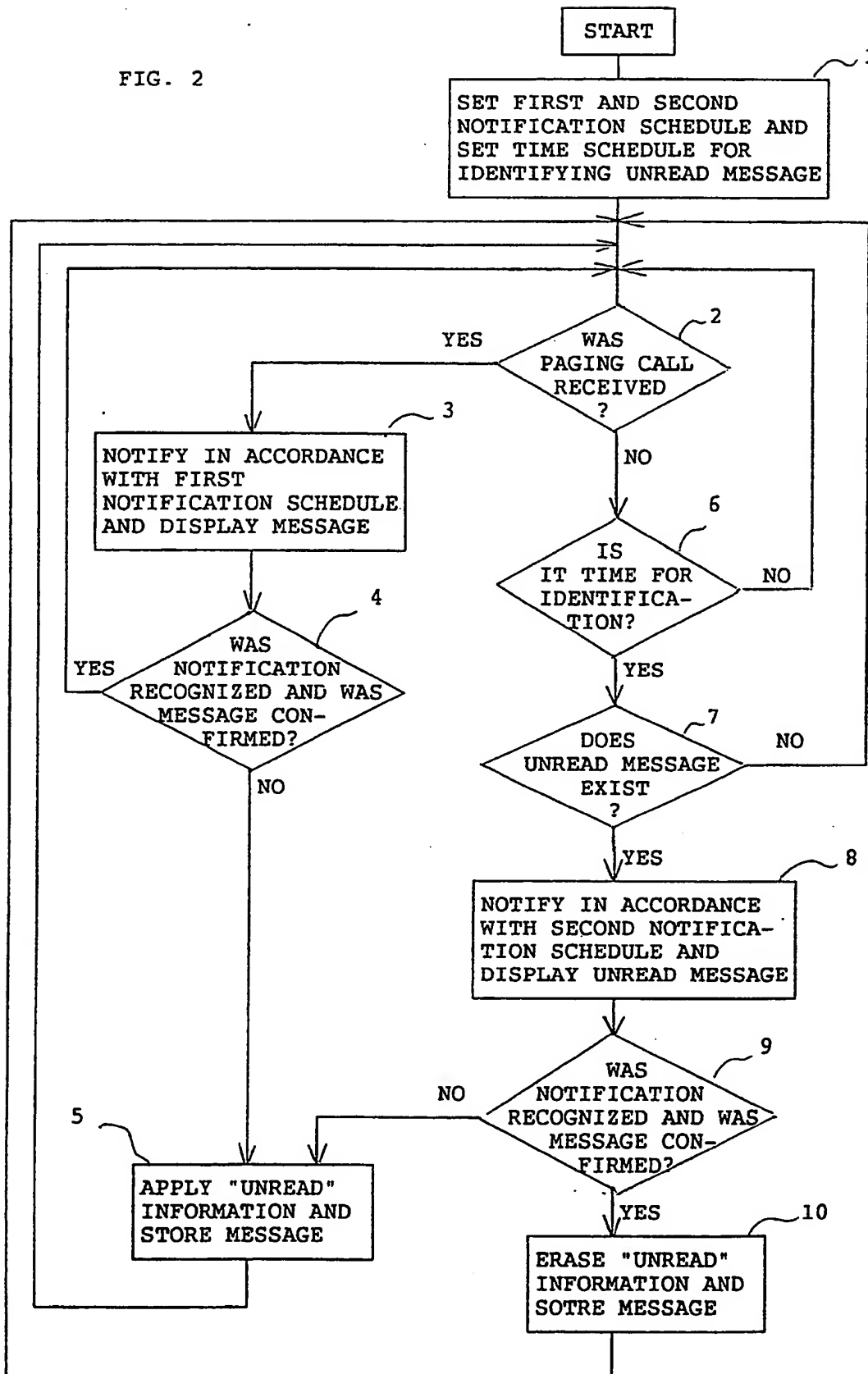


FIG. 3(a)

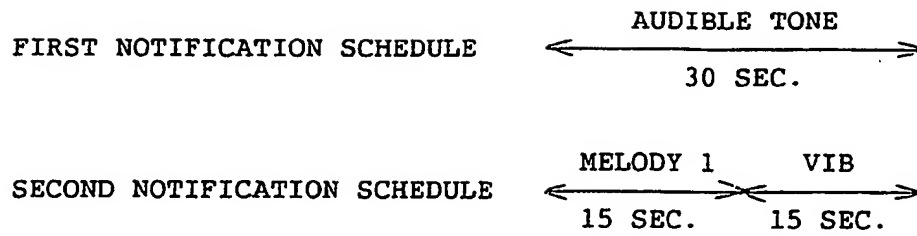
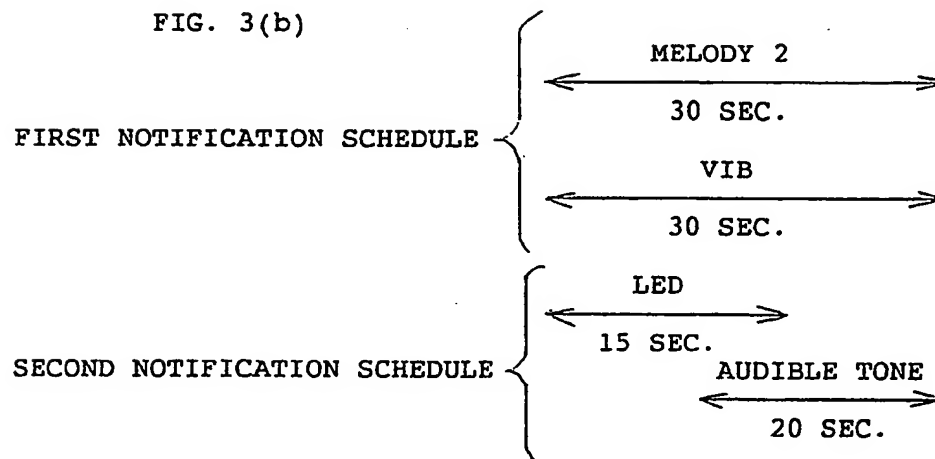


FIG. 3(b)



**PAGING RECEIVER**

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The present invention relates to a selective call radio paging receiver having a message display function, and particularly to a paging receiver capable of re-notifying an unread message.

10      **Description of the Prior Art**

Even when a paging receiver is carried, there are cases in which, for various reasons, a paging call does not reach the carrier of the receiver. When it is desired to use a paging receiver having a display  
15      function in a crowded area, there are often cases in which a carrier misses a call, for example, when the receiver is used in a silent mode in which a reception notification is performed by simply blinking a light emitting diode (LED).

20      To cope with such cases, a paging receiver with a display capable of storing a received message in a memory upon receipt and of reading out the stored message from the memory later under the action of a switch. As  
25      methods for notifying a carrier of the existence of a message still unread by the carrier when the message

exists within the memory, there have been a method for notifying the carrier by generating an audible tone when a switch is manually operated, and a function for displaying a solid line under the representation of a memory number at which the unread message is being stored, etc. Further, there has been proposed a function of automatically notifying unread messages stored in a memory at regular intervals (see Japanese Patent Laid-Open No. 233929/1989, for example).

10

Features of a paging receiver to be described are that it has a display function and a method of control, both of which are capable of automatically identifying the existence of messages still unread by a carrier, and of setting the conditions for notifying the existence of the unread messages, and finally of confirming the arrival of the messages at the carrier.

20

In a particular arrangement to be described, a paging receiver notifies the receipt of a paging call to a carrier of the receiver and includes

memory means for storing a message received subsequent to a page number of the paging receiver;

25

display means for displaying the message;

unread message identification means for identifying whether or not the message stored in the memory means upon receipt is still unread by the carrier and remained as an unread message;

5        identification time setting means for setting a time schedule for identifying by the identification means whether or not the unread message exists in the memory means; and

control means for controlling operations of each  
10 component of the paging receiver, and when the receipt of the paging call or the existence of the unread message is confirmed, notifying the receipt or the existence to the carrier and displaying the received message or the unread message on the display means.

15        In another arrangement a paging receiver notifies the receipt of a paging call to a carrier of the receiver and includes

memory means for storing a message received subsequent to a page number of the paging receiver;

20        display means for displaying the message;

unread message identification means for identifying whether or not the message stored in the memory means upon receipt is still unread by the carrier and remained as an unread message;

25        identification time setting means for setting a time schedule for identifying by the identification means

whether or not the unread message exists in the memory means;

a plurality of notification means;

notification schedule setting means for setting  
5 notification schedules for cases in which the paging call  
is received and in which the existence of the unread  
message is confirmed, the notification schedules  
specifying for each case independently at least one of  
the notification means to be activated together with each  
10 individual operating time of the at least one of the  
notification means; and

control means for controlling operations of each  
component in the paging receiver, and when the receipt of  
the paging call or the existence of the unread message is  
15 confirmed, notifying the receipt or the existence to the  
carrier in accordance with the respective notification  
schedules set by the notification schedule setting means  
and displaying the received message or the unread message  
on the display means.

20

A method of controlling a paging receiver which  
notifies receipt of a paging call to a carrier of the  
paging receiver will also be described, the method  
including the steps of

25 setting a time schedule for identifying whether or  
not a message received subsequent to a page number and



stored in memory means upon receipt of the paging call is still unread by the carrier and remained as an unread message;

identifying whether or not the unread message exists  
5 in the memory means according to the time schedule; and

when the existence of the unread message is confirmed, notifying the existence to said carrier, and displaying the message on displaying means.

There is provided another method of controlling a  
10 paging receiver which notifies receipt of a paging call to a carrier of the paging receiver by a plurality of notification means, the method comprising the steps of:

setting notification schedules for cases in which the paging call is received and in which a message  
15 received subsequent to a page number and stored in memory means upon receipt of the paging call is still unread by the carrier and remained as an unread message in the memory means, the notification schedules specifying for each of the cases independently at least one of the  
20 notification means to be activated together with each individual operating time of the at least one of the notification means.

setting a time schedule for identifying whether or not the unread message exists in the memory means;

25 identifying whether or not the unread message exists in the memory means according to the time schedule; and

}

when the receipt of the paging call or the existence of the unread message is confirmed, notifying the receipt or the existence in accordance with the respective notification schedules and displaying the message  
5 received or the unread message on display means.

A particular embodiment of the invention, and methods of operation of the invention, will now be described, as examples, with reference to the accompanying drawings, in which:-

10

FIG. 1 is a block diagram showing the structure of an embodiment of the paging receiver according to the present invention. .

FIG. 2 is a flowchart showing an example of the  
15 process of notification of the paging receiver in FIG. 1; and

FIG. 3(a) and (b) show two examples of notification schedules.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 A preferred embodiment of the present invention will hereinafter be described with reference to the accompanying drawings.

A paging receiver shown in FIG. 1 comprises antenna 1, radio unit 2, waveform shaping circuit 3, decoder 4,

quartz crystal 5, CPU 6, EEPROM (Electrically Erasable and Programmable ROM) 7, switch 8, LCD (Liquid Crystal Device) driving circuit 9, LCD 10, LED (Light Emitting Diode) driving circuit 11, LED 12, SP (Speaker) driving  
5 circuit 13, SP 14, VIB (Vibrator) driving circuit 15 and VIB 16. CPU 6 has memory 61 and timer 62 incorporated therein.

A radio signal received by antenna 1 is amplified and demodulated by radio unit 2. Waveform shaping  
10 circuit 3 converts the demodulated signal into a digital signal having a waveform which can be read by decoder 4. Decoder 4 receives the digital signal while keeping in synchronism with a reference clock produced by quartz crystal 5 and compares the signal with an address number  
15 (page number) of the paging receiver which has been written into EEPROM 7 in advance. If the digital signal coincides with the address number as a result of the comparison, then decoder 4 determines that a paging call is received to the paging receiver. Thereafter, decoder 4  
20 receives a message signal that follows the page number and sends the signal to memory 61 provided within CPU 6 to store. CPU 6 causes the driving circuits to drive the appropriate means for notification in order to notify the reception of the paging call, and causes LCD driving  
25 circuit 9 to drive LCD 10 in order to display the received message thereon. When the message stored in the

memory 61 at the time of reception is not read out by the carrier who has not recognized the notification signal, the message remains in memory 61 as an unread message.

The paging receiver has a plurality of notification means which include LED 12 driven by LED driving circuit 11 so as to blink light, speaker (SP) 14 driven by speaker driving circuit 13 so as to generate either an audible tone or a melody and vibrator (VIB) 16 driven by vibrator driving circuit 15 so as to produce vibrations.

10 CPU 6 which incorporates memory 61 and timer 62 controls operations of each component of the paging receiver in accordance with a control procedure stored in memory 61 and serves as an unread message identification means for identifying whether an unread message exists in memory 61

15 or not. Furthermore, CPU 6, in response to the operation of the switch 8, serves as an identification time setting means for designating a time schedule for identifying and confirming the existence of the unread message, and serves also as a notification schedule setting means for

20 specifying one or other notification means to be activated and their notification time periods in the cases when a paging call is received and when the existence of the unread message is confirmed.

In the time schedule of the identification of the

25 existence of the unread message, time can be set, for example, at a single specific time, a plurality of

specific times or at a plurality of times, each time at a predetermined time after the elapse of a specific time interval, taking into considerations the work schedule or activity of the carrier.

5        FIG. 2 is a flowchart for describing one example of the notification procedure according to the present invention of the paging receiver in FIG. 1.

At the beginning, the carrier operates switch 8 and sets first and second notification schedules and a time  
10 shedule for identifying the existence of unread messages stored in memory 61 into timer 62 through CPU 6 (Step 1). When a paging call to the paging receiver is received (Step 2), CPU 6 causes the notification means to notify the receipt of the paging call in accordance with the  
15 first notification schedule and causes LCD 10 to display a received message thereon (Step 3). When the a notification signal is recognized by the carrier, a reset operation of the switch 8 is reported to CPU 6 and the message is confirmed by the carrier (step 4). However,  
20 when the notification is not recognized by the carrier in a predetermined time interval, "unread" information is applied to the message and the message is stored in memory 61 as an unread message (step 5).

Next, CPU 6 searches the schedule of the  
25 identification of the unread messages, which has been set in timer 62 (Step 6). When an identification time comes,

CPU 6 searches the message with the "unread" information applied thereto (Step 7). If the answer is YES in Step 7, then CPU 6 causes the notification means to notify the existence of the unread message in accordance with the second notification schedule and causes LCD driving circuit 9 to display the unread message on LCD 10 (Step 8). When the notification signal of the existence of the unread message is recognized and the message is confirmed by the carrier (Step 9), the reset operation of switch 8 is reported to CPU 6 where the "unread" information is erased from the message and the message is stored in memory 61 (Step 10). When the above notification is not recognized for a predetermined time interval, the message with the "unread" information is stored in the memory 61 as an unread message (Step 5).

Unless the message is erased by the carrier's operation of switch 8, even after the message has been confirmed (YES in Step 4) and the "unread" information has been erased (Step 10), the message remains stored in memory 61 until memory 61 overflows.

The notification schedule designates or assigns an operating time (notifying time) to each notification means. The notification schedule permits an assignment of different time to each of the notification means, such as an assignment of the same time to a group of a plurality of notification means, an assignment of

different time to a single notifying means and a group of  
a plurality of notifying means, etc. Various  
notification schedules can be set by arbitrarily  
specifying a beginning instant and duration of time to  
5 arbitrary notification means.

The notification schedules are laid out by setting a  
first notification schedule for the case when the receipt  
of a paging call is notified and a second notification  
schedule for the case when the existence of an unread  
10 message is notified. Both schedules are prepared  
separately from each other. Taking into considerations  
the behavioral environments of the carrier and the  
distinctive features of the notification signals, etc,  
various variations will be introduced, for example, an  
15 audible tone in the case of the first notification  
schedule is regarded as a melody in the case of the  
second notification schedule, and different patterns of  
audible tones and different melodies may be prepared for  
the first and second notification schedules. The  
20 notification schedules are shown in FIG. 3(a) and (b) as  
illustrative examples.

While the preferred embodiment of the present  
invention has been described in detail, it is to be  
understood that many modifications and variations may be  
25 made without departing from the scope of the protection  
sought, as defined by the following claims.

CLAIMS

1. A paging receiver which notifies receipt of a paging call to a carrier of said receiver comprising:

memory means for storing a message received subsequent to a page number of said paging receiver;

5 display means for displaying said message;

unread message identification means for identifying whether or not said message stored in said memory means upon receipt is still unread by said carrier and remained as an unread message;

10 identification time setting means for setting a time schedule for identifying by said identification means whether or not said unread message exists in said memory means; and

control means for controlling operations of each  
15 component of said paging receiver, and when the receipt of said paging call or the existence of said unread message is confirmed, notifying said receipt or said existence to said carrier and displaying said received message or said unread message on said display means.

2. A paging receiver which notifies receipt of a paging call to a carrier of said receiver comprising:

memory means for storing a message received subsequent to a page number of said paging receiver;

5 display means for displaying said message;



unread message identification means for identifying whether or not said message stored in said memory means upon receipt is still unread by said carrier and remained as an unread message;

10        identification time setting means for setting a time schedule for identifying by said identification means whether or not said unread message exists in said memory means;

         a plurality of notification means;

15        notification schedule setting means for setting notification schedules for cases in which said paging call is received and in which the existence of said unread message is confirmed, said notification schedules specifying for each of said cases independently at least  
20        one of said notification means to be activated together with each individual operating time of said at least one of said notification means; and

         control means for controlling operations of each component in said paging receiver, and when the receipt  
25        of said paging call or the existence of said unread message is confirmed, notifying said receipt or said existence to said carrier in accordance with said respective notification schedules set by said notification schedule setting means and displaying said  
30        received message or said unread message on said display means.

3. The paging receiver as claimed in Claim 2, wherein the time for identifying whether or not said unread message exists is set at a plurality of times, each time at a predetermined time after the elapse of a specific  
5 time interval.

4. The paging receiver as claimed in Claim 2, wherein said plurality of notification means comprising light-emission notification means, audible tone notification means, melody notification means and vibration  
5 notification means.

5. A method of controlling a paging receiver which notifies receipt of a paging call to a carrier of said paging receiver, said method comprising the steps of:  
    setting a time schedule for identifying whether or  
5 not a message received subsequent to a page number and stored in memory means upon receipt of said paging call is still unread by said carrier and remained as an unread message;

    identifying whether or not said unread message  
10 exists in said memory means according to said time schedule; and

    when the existence of said unread message is confirmed, notifying said existence to said carrier, and displaying said message on displaying means.

6. A method of controlling a paging receiver which notifies receipt of a paging call to a carrier of said paging receiver by a plurality of notification means, said method comprising the steps of:

- 5        setting notification schedules for cases in which said paging call is received and in which a message received subsequent to a page number and stored in memory means upon receipt of said paging call is still unread by said carrier and remained as an unread message in said
- 10    memory means, said notification schedules specifying for each of said cases independently at least one of said notification means to be activated together with each individual operating time of said at least one of said notification means.
- 15        setting a time schedule for identifying whether or not said unread message exists in said memory means;
- identifying whether or not said unread message exists in said memory means according to said time schedule; and
- 20        when the receipt of said paging call or the existence of said unread message is confirmed, notifying said receipt or said existence in accordance with said respective notification schedules and displaying said message received or said unread message on display means.

7. The method of controlling a paging receiver which

notifies receipt of a paging call to a carrier of said  
paging receiver by a plurality of notification means as  
claimed in Claim 6, wherein the time for identifying  
5 whether or not said unread message exists is set at a  
plurality of times, each time at a predetermined time  
after the elapse of a specific time interval.

8. The method of controlling a paging receiver which  
notifies receipt of a paging call to a carrier of said  
receiver by a plurality of notification means as claimed  
in Claim 6, wherein said plurality of notification means  
5 comprising light-emission notification means, audio tone  
notification means, melody notification means and  
vibration notification means.

9. A paging receiver as claimed in claim 1  
substantially as described herein with reference to Fig.  
1 of the accompanying drawings.

10. A method of controlling a paging receiver as claimed  
in claim 5 substantially as described herein with  
reference to Fig. 2, Fig. 3a, or Fig. 3b of the accom-  
panying drawings.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
GB 9424065.2

**Relevant Technical Fields**

- (i) UK Cl (Ed.M)      G4H (HRCU)  
(ii) Int Cl (Ed.5)      G08B

Search Examiner  
M J DAVIS

Date of completion of Search  
21 DECEMBER 1994

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
1-10

(ii)

**Categories of documents**

- |  |   |
|--|---|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
|--|---|

| Category | Identity of document and relevant passages | Relevant to claim(s) |
|----------|--|----------------------|
| X, P     | GB 2267770 A (NEC) whole document          | 1, 5                 |
| X        | GB 2243507 A (NEC) whole document          | 1, 5                 |

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